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Almost every stick in a native house bears its special name. Each one of the six houses, that every well-to do Hawaiian was supposed to have, before the advent of the whites, had its appropriate use and name.

These were—

1. The *Heiau*, where the idols were kept.
2. The *Mua*, the eating-house for the husband.
3. The *Noa*, or separate house for the wife.
4. The *Hale aina*, or eating-house for the wife.
5. The *Kua*, or the wife's work-house.
6. The *Hale pea*, or the hospital for the wife.

To fully understand these arrangements we must bear in mind that during the reign of the *tabu*, men and women never ate together under any circumstances. The food of the husband could not be cooked in the same oven used by the wife, and pork and many kinds of fish were absolutely prohibited to females; but they could eat dog and fowl.

The custom of applying a term connected with the position of the sun to designate a locality, common in other countries, finds usage in Hawaii. France has her *Midi*, Spain her *Levante* and *Poniente*, and the Kanakas their *Kau*. *Kau* means summer or warm season, and is used to designate the most southern province of Hawaii. In the first case we have the name of the hottest part of the day given to the territory, and in the latter the name of the hottest part of the year is so utilized.

Seat of Moral Powers.—Parallel Italian Expressions.—The Hawaiians supposed that each man had two souls. One died with the body, the other lived on as a ghost, and was known by strange squeaking or whistling sounds (*muki*), like the ghosts which did 'squeak and gibber in the Roman streets.' Polynesian ethics also taught that the seat of the moral powers was in the small intestines. The word *loko*, which means *within*, was applied to the moral state or disposition. This idea was so

prominent that large stomachs were cultivated as indicative of great moral strength. The word *papio* was applied to the act of lying face downward with nothing for the belly to rest on for the purpose of enlarging it and thus augmenting the moral powers.

This peculiar thought, after all, is not very far removed from that contained in the Italian expressions, *amico viscerato*, bosom friend, and *un amore viscerato*, an intense passionate love—literally a disemboweled love. No doubt the idea came through sources where a belief was held similar to that prevalent in Hawaii. Compare also *Mi ha levato un peso dallo stomaco*, He took a weight off my stomach; likewise the sentence, *Questa nuova vi ferirà nella parte più cara delle vostre viscere*. Besides, there has always been more or less connection, either expressed or implied, between the mind and stomach. It was in the Latin language that the original Greek word *στόμα* changed its meaning from mouth to belly. After this the step was easy from the organs of digestion to those of sentiment, and we find many examples in the Romance languages of this enlarged meaning of the original word. So the idea finds expression not alone in the South seas, but may be found cropping out all along the road of linguistic development, whether it be in Greece or Polynesia.

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COAL FLORAS OF THE MISSISSIPPI VALLEY.

THE plant remains of the Trans-Mississippian coal field have received but scant notice. Something of their character is found recorded in the writings of Lesquereux, Newberry and others. These, however, are the merest glimpses, and give but faint conception of the actual extent and multiplicity of form that the floras of the coal measures present.

The idea has gained currency that the Carboniferous fossil plants of the Mississippi valley are most meagerly represented. The present note endeavors to point out that this widespread notion is wholly erroneous. In vastness, in great variety, in extensive geological range, in completeness of generic representation, in wealth of anatomical material, the fossil floras of the region are believed to have but few equals.

There are several reasons for the apparent paucity of plant remains in the beds of the coal measures. The preservation of the plants is confined almost entirely to the clay shales and shally sandstones. These readily break down under ordinary weathering influences into soft clays. The most prolific plant bed may be thus destroyed, giving scarcely a sign of its organic content. Even in coal mines the obliteration of whatever fossils exist goes on so rapidly that fossil ferns usually fail to attract notice. Only when the perfectly fresh shales are exploited purposely for their fossils can they be made to give up their botanical records.

Many plant remains are preserved or replaced by iron pyrite and quickly decomposed on exposure. The finest structures, displaying anatomical features in the greatest perfection, are frequently in this condition; but it is only when in the fresh state that outlines and markings of the cells are capable of being studied with satisfaction.

Probably the greatest drawback to the acquirement of a complete knowledge of the fossil floras is the lack of interest shown by local collectors. Few fossil gatherers give any attention whatever to the plants. The Paleobotanists are not given to making systematic collections themselves, but study only those scattered chance specimens in cabinets devoted to other fossil forms. As a result we have no complete plant collections.

From the paleontological literature we get only a faint glimpse of the Trans-Mississippian flora. Outside of a few isolated references the only account of an extensive flora is that of Lesquereux, whose material was obtained by Dr. G. H. Britts, of Clinton, Mo. The Britts' collections have been studied anew by David White, whose recent excellent monograph on the Fossil Plants of Missouri shows only too clearly how prolific may be the coal plants of a single locality and of a single horizon. No indication, however, is given regarding the vast possibilities of this coal district as a field for systematic exploitation along paleobotanic lines.

Attention is called in the monograph to some of the obstacles to accuracy in correlation and especially to the lack of standard paleobotanic sections. If ever there were opportunity of establishing a standard section it is in the Trans-Mississippian coal field. Plant remains occur abundantly in many localities and at many horizons, extending from the very base of Des Moines series, up through Missourian, into the so-called Permian. The monograph on the Missouri fossil floras considers chiefly one locality and one horizon. In Missouri alone there are no less than 150 known localities and 30 horizons for coal plants. In Iowa there are nearly as many more. Kansas likewise offers an equally inviting field. If a single location yields up such prodigious possibilities as Mr. White has demonstrated what may we not expect from the rest of the field?

Of Missouri localities furnishing fossil plants, Rich Hill, Kansas City, Lexington, Versailles, Huntsville, Macon and Moberly afford especially attractive fields for early exploration. Exceptional opportunities for the construction of standard paleobotanic sections are offered in the west-central part of the State. These are easily made in a direction east from Kansas City, along the

Missouri river, and continued in the Missourian series along the same stream north from the city. Or, a direction taken south-east of Kansas City is equally advantageous, besides passing through the Clinton district, and reaching into the old gorges in the Mississippian series which are exposed on the flanks of the Ozarks. Work along these lines, both in the floral and faunal fields were begun by the Missouri Geological Survey in connection with the detailed stratigraphical cross-sections, and much valuable material obtained, but the efforts had to be abandoned before the data were complete.

The exposures along the Des Moines and Raccoon rivers, in central Iowa, afford another excellent field for making up a standard paleobotanic section. Plant remains occur in many localities and at numerous horizons. Some exquisite things have been observed. Van Meter affords beautiful ternately divided fern fronds over a yard across. Mud Creek, below the city of Des Moines, furnishes, in profusion, plant-bearing nodules similar to Mazon Creek, in Illinois. Ford supplies structural specimens, showing the wood cells and their workings as perfectly as if they were taken from the living plant. Knoxville has extensive plant beds and the bluffs of the streams in Marion county often have tons of shale-slabs with plants in sight at one time. At one time the Iowa Geological Survey began to get material of this kind together for a report on the coal floras of the State supplementary to the reports on coal deposits. But since the appearance of the first volume of the latter nothing farther seems to have been done regarding the plants.

The main consideration, however, is the fact that the Trans-Mississippian coal field presents for the study of fossil plants a wealth of material unrivalled in the whole country. If standard paleobotanic sections of the region are lacking, it is certainly not

because the fossil botanist lacks the material and opportunity to construct them.

CHARLES R. KEYES.

ON THE ZOO-GEOGRAPHICAL RELATIONS OF AFRICA.*

THE speaker prefaced his communication by remarking that he had nothing absolutely new to bring forward, but that, inasmuch as some views which seemed to be contrary to evidence had been urged very recently, a presentation of the conflicting evidence was timely, if not necessary. The views in question were broached in 'A Geographical History of Mammals,' by Mr. R. Lydekker, and the address of the retiring president of the New York Academy of Sciences (Professor H. F. Osborn) published last week in *SCIENCE* (April 13th).

Beaumont's apologue of the shield has its counterpart for the fauna of Africa. It has two sides facing in opposite directions, and it cannot be understood without taking both into consideration. The proposition to combine Africa with Asia, Europe and North America into a realm contrasted with South America and Australia (or even to combine again Africa and India against the others) may apparently be justified if we look only to the present mammalian fauna, but if we revert to the past and consider other classes, we must be led to different conclusions.

The fishes are by far the most instructive in their teaching. Very recent discoveries recorded by Mr. Boulenger add force to their testimony. Those animals represent two very distinct assemblages. On the one side, we have Cyprinids of genera occurring also in India or very closely related to such genera. On the other side, we see numerous species belonging to families having no representatives in India or elsewhere than in tropical America. Such are the Cichlids,

* A communication to the National Academy of Sciences made April 18, 1900, by Dr. Theodore Gill.